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09/957,461	09/21/2001	Yoshio Machida	2382-21	2595

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EXAMINER

SULLIVAN, JULIANNE M

ART UNIT	PAPER NUMBER
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3737

DATE MAILED: 10/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/957,461

Applicant(s)

MACHIDA, YOSHIO

Examiner

Julianne M. Sullivan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 April 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

1. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

2. The abstract of the disclosure is objected to because it contains the legal phraseology "means" on lines 1, 3 and 4. Correction is required. See MPEP § 608.01(b).
3. Regarding the disclosure, it is suggested that the following typographical errors be corrected for added clarity: "continuos" on page 3, lines 8, 13, 20 and 21; "refereeing" on page 17, line 19; "bellows" on page 20, line 8; and "medial" on page 22, line 16.

Claim Objections

4. Claim 9 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. It appears that Claim 9 was incorrectly presented as depending from Claim 8, rather than Claim 6, as may have been intended.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-5, 8, and 13-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Margosian et al. (U.S. Patent No. 5,423,315).

Regarding Claim 1, Margosian et al. teaches a magnetic resonance imaging system (col. 1, line 69) comprising: scanning means for selectively exciting in turn a plurality of regions of an object acquiring echo data from the object while the object is continuously moved (col. 2, lines 1-17 and 39-41); and processing means for producing image data from the echo data acquired by the scanning means (col. 2, lines 41-43), wherein the scanning means includes position-moving means for moving the plurality of selectively excited regions according to a movement of the object such that the plurality of regions are selectively excited in sequence region by region within a predetermined imaging range (col. 2, lines 10-17 and col. 5, lines 21-26 and 30-37).

Regarding Claim 2, Margosian et al. also teaches a magnetic resonance imaging system where the imaging range is determined fixedly in space by the magnetic resonance imaging system (col. 2, lines 5-8). As in Claim 3 of the present application, Margosian et al. teaches a magnetic resonance imaging system where the scanning means includes a couch with a tabletop on which the object is laid, the couch having a mechanism for moving the tabletop in a longitudinal direction of the tabletop (col. 4, lines 56-60, col. 8, lines 6-9 and "C" in Fig. 1). Regarding Claims 4 and 5, Margosian et

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al. teaches an MRI system where the plurality of regions are composed of multi-slices of the object (col. 2, lines 41-43), and where the slice-selective axis of the multi-slices agrees with the moving direction of the object (col. 2, lines 41-43 and col. 13, lines 6-15 and 35-41).

Regarding Claim 8, Margosian et al. teaches an MRI system where the position-moving means is configured to change slice by slice the carrier frequency of the selective-excitation RF pulse to be applied to the multi-slices (col. 5, lines 30-37).

Regarding Claim 13, Margosian et al. teaches an MRI system where the scanning means uses a pulse sequence based on a fast spin echo technique, including a gradient that meets, at least partly, a VIPS condition (col. 6, lines 47-51).

Regarding Claim 14, Margosian et al. further teaches a method for magnetic resonance imaging that allows an object to be imaged while the object is moved continuously (col. 12, lines 21-23), comprising the steps of: selectively exciting a plurality of regions of the object in sequence region by region within a predetermined imaging range (col. 12, lines 24-30); and moving positions of the plurality of regions selectively excited within the imaging range in compliance with a movement of the object (col. 12, lines 31-39). As in Claim 15 of the present application, Margosian et al. teaches a method for magnetic resonance imaging where the imaging range is determined fixedly in space by the magnetic resonance imaging system (col. 12, lines 14-20).

Regarding Claims 16 and 17, Margosian et al. teaches an MRI method where the plurality of regions are composed of multi-slices of the object (col. 12, lines 29-30), and where the slice-selective axis of the multi-slices agrees with the moving direction of the object (col. 12, lines 24-30 and col. 13, lines 6-15 and 35-41).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 6, 9 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Margosian et al. in view of Kuhn et al. (U.S. Patent No. 5,636,636).

Regarding Claims 6, 9 and 18, Margosian et al. discloses all of the features of the present invention except for expressly describing an MRI system where the slice-selective axis of the multi-slices is different from the moving direction of the object and the corresponding configuration of the position-moving means to change slice by slice the carrier frequency of the selective-excitation RF pulse to be applied to the multi-slices in compliance with the geometrical relationship between the moving direction of the object and the slice selecting direction.

In the same field of endeavor, Kuhn et al. expressly teaches a magnetic resonance system wherein an object is moved continuously through the imaging range and the slice-selective axis is different from the moving direction of the object (col. 6, lines 34-36). Kuhn et al. further teaches that the carrier frequency of the selective-excitation RF pulse must be changed in compliance with the geometrical relationship between the moving direction of the object and the slice selecting direction (col. 6, lines 36-40).

It would have been obvious to one skilled in the art at the time the invention was made to have modified Margosian et al. to incorporate the teachings of Kuhn et al. to produce magnetic resonance images using a slice-selection axis different from the

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moving direction of the object based on the reference to such oblique slices in Margosian et al. (col. 6, lines 4-9) in order to provide more useful images of structures within an object.

9. Claims 7, 10 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Margosian et al. in view of Hajnal (U.S. Patent No. 6,385,478).

Regarding Claims 7 and 19, Margosian et al. discloses all of the features of the present invention except for providing that the scanning means of the MRI system includes means for adding another slice to the tail of a group of multi-slices as a slice at the head of the group of multi-slices in the moving direction goes out of the imaging range. However, in the same field of endeavor, Hajnal expressly discloses an MRI system and method where an additional slice is added to the end of the imaged volume as successive slices at the front of the volume move out of the imaging range (col. 5, lines 62-67 and col. 6, lines 1-5).

It would have been obvious to one skilled in the art at the time that the invention was made to have modified Margosian et al. to incorporate the teachings of Hajnal as a practical means of extending the imaging volume once the initial slices had passed through the imaging range, in order to image a volume of indefinite length, as referenced in Margosian et al. (col. 3, lines 10-11).

Regarding Claim 10, Margosian et al. discloses the invention essentially as claimed except for a processing means including phase correcting means for correcting the phase of echo data acquired by the acquisition means on the basis of the geometrical relationship between the position of the object and the direction in which a gradient is applied, and reconstructing means for reconstructing the echo data of which phases are

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corrected by the phase correcting means. Hajnal expressly discloses a processing means including a phase correcting means for correcting the phase of echo data on the basis of the geometrical relationship between the position of the object and the direction in which a gradient is applied (col. 2, lines 36-38 and col. 5, lines 35-44), and a reconstructing means for transforming the data samples corrected by the correcting means into an image (col. 8, lines 64-67).

It would have been obvious to one of ordinary skill in the art at the time that the invention was made to have modified Margosian et al. to incorporate the teachings of Hajnal in order to improve image quality when the moving direction of the object is different from the slice-selective axis (see for motivation to combine Hajnal, col. 2, lines 33-39).

10. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Margosian et al. in view of Pipe (U.S. Patent No. 5,327,088).

Margosian et al. discloses all of the features of the present invention except for use of a preparation pulse. In the same field of endeavor, Pipe teaches a magnetic resonance imaging technique including the use of a preparation pulse for reducing motion artifacts (col. 3, lines 9-13 and Fig. 10).

It would have been obvious to one skilled in the art at the time that the invention was made to have modified Margosian et al. to incorporate the teachings of Pipe to use a preparatory pulse in order to reduce the motion artifacts that result from the continuous movement of the object through the imaging range, as discussed in Margosian et al. (col. 5, lines 1-3), and thereby improve the quality of the images produced.

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11. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Margosian et al. in view of Miyamoto (U.S. Patent No. 6,483,305).

Margosian et al. discloses all of the features of the present invention except for use of a pulse sequence having a gradient pulse applied in the moving direction of the object, in which a phase compensation pulse for nulling a gradient moment of a first or second order is added to at least part of the gradient pulse.

In the same field of endeavor, Miyamoto does teach the use of a gradient where a phase compensation pulse for gradient moment nulling is applied (col. 5, lines 3-9). It would have been obvious to one skilled in the art at the time that the invention was made to have modified Margosian et al. to include the teachings of Miyamoto in order to improve image quality by eliminating phase variation induced by motion of the object (see for motivation to combine Miyamoto, col. 5, lines 10-13).

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Julianne M. Sullivan whose telephone number is 703-305-0577. The examiner can normally be reached on Monday through Friday 8:00am to 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Casler can be reached on 703-308-3552. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JMS


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